APPENDIX M

QA/QC Memoranda for the Summer and Fall 1999 Coeur d'Alene Basin Sampling Events

Appendix M

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This appendix contains three QA/QC memoranda for the Summer and Fall 1999 sampling events for the Coeur d'Alene Basin. The memos outline QA/QC procedures and results for reanalysis of the 1996 IDHW samples, 1999 samples analyzed through EPA Contract Lab Program (CLP) laboratories, and 1999 low weight samples that were analyzed at a local Idaho laboratory because they did not have sufficient amount to be processed through CLP.

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M E M O R A N D U M

To: Gerald B. Lee, TerraGraphics, Moscow

From: Shanda LeVan, TerraGraphics, Moscow

Date: February 17, 2000

Subject: QA/QC Review for the 1996 Basin Archive samples analyzed by Anatek Labs during Fall 1999.

Introduction

The following memorandum summarizes the quality assurance/quality control (QA/QC) review for the 1996 Basin Archive samples analyzed by Anatek Labs during the Fall of 1999. These samples were re-analyzed for 24 metals. No field QA/QC samples were included in the samples sent to Anatek for analysis. Only internal QA/QC for laboratory analysis is available.

General

A QA/QC review was done to evaluate the precision, accuracy, completeness, and representativeness of the data obtained from the laboratory. Procedures for sample labeling, handling, and analysis were as described in the Final Field Work Plan for the Coeur d'Alene River Basin Environmental Health Exposure Assessment (TerraGraphics, 1996). This data validation review indicated all samples were properly labeled and tracked during the project and throughout the archive process. In the fall of 1999, 65 prioritized samples were selected from this archive collection and sent to Anatek Labs, Inc. in Moscow, Idaho for total metal analysis.

Two of the lab's QC batches were below percent recovery for matrix spike/matrix spike duplicate (MS/MSD) analysis for lead in one batch and zinc in the other. Nine samples were qualified as estimates for lead (27136-21 through 27136-29) and nine samples (27136-30 through 27136-38) for zinc. As a result of the required 28 day holding time for mercury, concentrations from all samples for this metal have been rejected. It must also be noted that these archived samples are

more than three years old and holding times for other metals are six months. For the purposes of this memo we will not consider this in determining QA/QC completeness. Data appear on Table 1.

Laboratory Analysis

A total of 65 samples were submitted to Anatek and analyzed for 24 metals. Laboratory QA/QC was not checked externally because duplicate samples and NIST standards were not included due to budget limitations. Anatek provided a copy of their internal QA/QC results for method blanks, laboratory control samples (LCS), and MS/MSD analysis.

Internal QA/QC

Anatek analyzed a total of seven method blanks to ensure no bias was introduced during sample preparation. All prep blanks were below the instrument detection limits for all metals analyzed. No qualifiers were placed on the data based on Anatek's prep blank results.

Internal checks of Anatek's accuracy were assessed by analyzing seven soil laboratory control samples (LCS). All LCS displayed acceptable percent recoveries and/or were within the acceptable range specified by Anatek.

Internal checks of laboratory precision at Anatek were assessed using matrix spike/matrix spike duplicates. MS/MSD were analyzed on six of the 65 samples (approximately 1 in 11). Calculated relative percent difference (RPD) values for the MS/MSD samples were within acceptable limits and ranged from 0.0% to 10.1%, with an average of 2.3%. Spike percent recoveries were within acceptable limits except in two QC batches for lead and zinc. In one batch the percent recovery of lead for the spike and spike duplicate was 63.41% and 68.29%, respectively. In the other batch zinc's percent recovery was 88.59% for the spike and 72.3% for the spike duplicate. The acceptable range for percent recovery is from 75% to 125%. All sample results for lead and zinc contained in the corresponding batches were qualified as estimates.

Conclusions

No field QA/QC results are available due to the lack of field QA/QC samples included in the total samples analyzed.

An internal check of Anatek's laboratory accuracy was assessed using soil LCS. All LCS results were within acceptable limits. Laboratory precision was assessed using duplicate analyses. All duplicates displayed acceptable RPD values. However, nine sample results for lead (27136-21 through 27136-29) and nine samples for zinc (27136-30 through 27136-38) were qualified as estimates based on low percent recoveries during the spike duplicate analysis. All metal concentrations in all laboratory prep blanks were below detection limit. Mercury in all 65 samples was rejected because the required 28 day holding time was grossly exceeded for this metal.

Based on a complete review of the method blanks, LCS, and duplicate analyses, the final completeness for the study was assessed at 99.99%.

Table 1 Coeur d' Alene Basin Archive Sample Results - 11/16/99 and 12/03/99 (EPA 6020 Analysis)

Sample	Lab #	Units	Arsenic	Barium	Cadmium	Chromium	Mercury	Lead	Selenium	Silver	Copper	Calcium	Aluminum	Antimony	Beryllium	Iron	Magnesium	Manganese	Nickel	Potassium	Silica	Sodium	Thallium	Zinc	Vanadium	Cobalt
S-0001	27259-02	mg/Kg	10.8	352	6.9	15.3	0.9R	1000	ND	2.3	53.8	5830	8190	5.1	ND	17560	3180	1090	15.3	1360	NA	114	ND	656	13.9	7.7
S-0010	27178-02	mg/Kg	4.6	202	1.5	8.9	ND	117	ND	ND	34.4	2850	10210	ND	ND	12690	2060	533	7.6	1510	ND	66	ND	158	18.2	6.6
S-0011	27259-01	mg/Kg	22.4	196	6.0	22.6	1.2R	1180	ND	7.0	41	4760	4680	12.9	ND	16890	2430	1150	9.9	1030	NA	157	ND	515	12.9	4.8
S-0034	27259-04	mg/Kg	47.3	307	9.6	17.7	5.1R	5290	ND	17.0	116	1180	4790	40.3	ND	46650	2530	3780	9.6	625	NA	76	ND	1080	11.3	6.0
S-0054	27178-03	mg/Kg	5.6	179	ND	9.11	ND	37.6	ND	ND	17.8	1830	7810	ND	ND	11740	2870	354	24.8	1390	ND	117	ND	80.3	16.8	5.9
S-0057	27259-03	mg/Kg	9.1	168	ND	16.3	ND	33.5	ND	ND	40.1	4000	10930	ND	ND	15490	4680	522	34.5	1440	NA	101	ND	65.9	20.8	6.8
S-0067	27136-28	mg/Kg	5.1	160	ND	9.24	ND	66.1J	ND	ND	13.2	1320	6430	ND	ND	11600	2270	343	7.3	1050	1820	ND	ND	78.7	14.7	5.5
S-0086	27259-05	mg/Kg	3.7	154	0.8	23.8	ND	44.9	ND	1.4	22.7	2200	7470	1.6	ND	13290	2440	413	8.4	1760	NA	174	ND	59.7	23.6	6.5
S-0118	27136-14	mg/Kg	5.6	201	2.0	34.4	ND	439	ND	1.9	30.7	2860	11520	2.2	ND	14190	2730	436	16.7	998	3460	ND	ND	217	19.5	6.9
S-0119	27259-06	mg/Kg	5.7	133	1.4	16.9	ND	240	ND	ND	22	2740	6330	ND	ND	13500	2540	558	13.7	1170	NA	62.6	ND	241	17.8	6.0
S-0127	27259-07	mg/Kg	15.9	295	2.2	22.3	0.5R	463	ND	ND	72.3	2400	11390	7.5	ND	24230	3650	1060	14.8	1650	NA	101	ND	212	31.9	11.3
S-0128	27136-17	mg/Kg	12.5	193	2.9	10.9	ND	334	ND	1.4	26.8	1830	11470	4.4	ND	12410	2750	446	10.6	807	1840	117	ND	202	19.2	6.4
S-0135	27259-08	mg/Kg	6.0	68.1	ND	31.8	ND	14.1	ND	ND	23.6	1250	6260	1.0	ND	14780	3100	251	11.5	1790	NA	81.8	ND	35	24.4	7.6
S-0136	27178-04	mg/Kg	9.5	154	2.4	11.6	ND	326	ND	ND	32.3	2270	8280	1.6	ND	16170	3040	681	24.5	1540	ND	70	ND	296	18.9	7.6
S-0139	27259-09	mg/Kg	2.3	148	2.2	52.0	ND	151	ND	3.0	23.9	3990	8660	2.5	ND	11830	2200	554	7.9	1100	NA	291	ND	107	27.7	5.2
S-0159	27136-16	mg/Kg	7.2	105	1.9	12.7	ND	216	ND	1.2	23.5	1290	6680	1.9	ND	12930	2850	350	8.5	907	1840	ND	ND	175	13.8	6.3
S-0191	27136-27	mg/Kg	5.6	168	ND	9.81	ND	28.3J	ND	ND	15.8	814	17090	ND	ND	13300	2610	391	11.2	885	3600	ND	ND	56.9	20.6	5.7
S-0194	27136-18	mg/Kg	15.3	154	2.2	13.1	ND	243	ND	1.3	24	5010	8710	2.9	ND	14350	1820	759	9.9	658	1830	ND	ND	239	17.7	7.5
S-0201	27178-05	mg/Kg	4.3	197	2.3	7.8	ND	145	ND	ND	23.9	3660	8840	1.0	ND	12100	1910	535	6.2	1030	ND	117	ND	232	25.5	6.0
S-0208	27136-25	mg/Kg	16.6	167	2.5	12.6	ND	161J	ND	1.0	33.8	2670	10310	7.8	ND	14410	2030	643	12.7	676	2260	120	ND	252	18.2	8.3
S-0237	27136-24	mg/Kg	7.2	180	1.7	11.0	ND	156J	ND	ND	32.3	3150	15430	1.4	ND	13150	2970	523	22.0	874	3420	187	ND	217	21.3	6.1
S-0289	27136-21	mg/Kg	7.5	171	2.4	30.4	ND	307J	ND	1.7	22.7	1230	10130	2.2	ND	13870	1310	418	9.5	501	2410	ND	ND	136	16.1	6.5
S-0295	27136-20	mg/Kg	23.2	149	8.1	15.8	ND	498	ND	2.1	38.5	2710	9590	3.3	ND	18360	2390	659	15.6	881	2060	134	ND	390	16.3	10.5
S-0298	27136-29	mg/Kg	34.1	170	4.3	22.6	ND	226J	1.3	5.5	43.4	2660	12020	5.2	ND	24080	2040	788	28.7	926	8790	ND	ND	251	21.3	12.3
S-0299	27136-19	mg/Kg	12.1	238	ND	15.4	ND	27.7	ND	6.1	38.8	3960	19580	ND	ND	14170	5150	471	15.0	2110	3020	150	ND	86.1	23.8	6.3
S-0309	27136-23	mg/Kg	39.7	203	14.6	19.8	1.6R	936J	ND	5.2	43.8	2510	13290	8.4	ND	18880	2550	694	20.7	909	2360	102	ND	440	18.2	9.4
S-0323	27136-22	mg/Kg	22.3	172	15	10.2	4.9R	3150J	ND	10.0	77.1	2890	8130	7.9	ND	22710	1520	1690	31.9	834	2190	126	ND	1320	14.2	9.9
S-0389	27136-30	mg/Kg	6.2	176	2.0	8.08	ND	184	ND	1.6	28.9	3060	9970	5.7	ND	8730	2040	505	6.2	375	ND	192	ND	302J	12.0	5.0
S-0419	27178-01	mg/Kg	11.2	223	3.4	18.5	ND	783	ND	2.0	51.5	4540	9690	7.4	ND	13650	2440	661	10.4	879	ND	109	ND	464	15.7	6.4
S-0423	27178-06	mg/Kg	8.7	179	4.4	6.5	ND	591	ND	1.4	32.4	2940	13760	3.9	ND	11030	1270	864	13.4	700	ND	87	ND	695	15.6	4.9
S-0426	27136-31	mg/Kg	32.5	272	12.2	10.4	2.5R	1820	ND	5.4	88.4	4120	12530	9.0	ND	23220	2890	1920	12.0	551	ND	109	ND	1890J	14.6	12.8
S-0448	27136-32	mg/Kg	6.4	190	ND	11.7	ND	46.5	ND	ND	17.3	647	16650	1.3	ND	13390	2120	414	7.6	457	ND	67	ND	88.5J	23.4	5.4
S-0449	27136-33	mg/Kg	18.8	279	2.7	11.9	ND	602	ND	2.5	95.7	3520	15900	10.4	ND	19790	3350	1300	11.4	615	ND	91	ND	488J	21.0	9.6
S-0453	27136-34	mg/Kg	8.0	234	1.7	58.2	ND	109	ND	ND	38.8	3430	15960	1.5	ND	13410	4220	535	10.1	1080	ND	116	ND	167J	18.4	5.6
S-0458	27136-35	mg/Kg	24.0	254	13.4	14.6	3.7R	3370	ND	9.7	65.8	3960	14770	12.4	ND	22000	3450	1770	10.2	584	ND	120	ND	1650J	18.9	8.6
S-0468	27178-07	mg/Kg	11.0	175	ND	12.0	ND	29	ND	ND	19.1	2900	14750	ND	ND	15750	5700	831	9.4	2130	ND	77	ND	80.6	26.9	7.9
S-0499	27136-15	mg/Kg	9.0	290	5.2	44.9	ND	960	ND	3.9	39.2	3220	16610	4.0	ND	17320	1870	1930	10.5	499	3440	ND	ND	619	20.5	6.8
S-0514	27136-36	mg/Kg	13.6	557	6.1	25.9	ND	1180	ND	5.8	46.4	5400	13000	14.5	ND	18870	1800	1360	7.4	839	ND	146	ND	874J	20.3	7.6

Table 1 Coeur d' Alene Basin Archive Sample Results - 11/16/99 and 12/03/99 (EPA 6020 Analysis)

Sample	Lab #	Units	Arsenic	Barium	Cadmium	Chromium	Mercury	Lead	Selenium	Silver	Copper	Calcium	Aluminum	Antimony	Beryllium	Iron	Magnesium	Manganese	Nickel	Potassium	Silica	Sodium	Thallium	Zinc	Vanadium	Cobalt
S-0516	27136-37	mg/Kg	6.6	300	1.5	11.0	ND	298	ND	ND	31.6	3000	19180	2.1	ND	14660	2740	657	10.5	418	ND	100	ND	171J	27.0	6.5
S-0517	27136-38	mg/Kg	19.3	364	3.1	36.1	ND	548	ND	1.7	43.9	3540	17700	2.0	ND	14940	2160	796	14.0	838	ND	82	ND	449J	26.3	6.6
S-0543	27136-13	mg/Kg	17.2	376	10.5	13.9	7.4R	5140	ND	16.1	377	4630	11950	16.4	ND	21770	1760	2400	13.2	586	2630	ND	ND	1510	13.9	11.4
S-0571	27178-08	mg/Kg	19.9	286	4.0	15.9	1.1R	1180	ND	6.4	85.8	2680	8600	13.8	ND	12930	1260	1190	6.9	368	ND	84	ND	572	10.6	4.6
S-0627	27136-12	mg/Kg	13.4	194	4.1	10.7	ND	591	ND	3.0	39.6	4490	10810	4.8	ND	16940	2580	793	14.2	869	2070	101	ND	635	16.8	8.5
S-0643	27136-11	mg/Kg	12.0	189	3.9	20.3	ND	325	ND	1.8	29.4	2210	8320	2.7	ND	15140	1390	923	15.8	452	1780	ND	ND	274	15.7	7.5
S-0644	27136-26	mg/Kg	15.7	226	11.9	52.9	1.7R	1560J	ND	6.7	53.1	3960	10190	11	ND	18600	1830	1230	11.1	763	1830	113	ND	1010	16.2	7.6
S-0649	27136-09	mg/Kg	14.3	270	7.8	15.0	ND	679	ND	3.5	41.1	2980	12250	5.8	ND	15540	1880	785	10.2	775	2270	104	ND	748	15.6	7.1
S-0651	27178-09	mg/Kg	11.2	217	3.1	15.3	ND	217	ND	ND	25.2	2770	13420	1.8	ND	13370	1420	831	11.3	839	ND	74	ND	257	15.2	6.0
S-0657	27136-10	mg/Kg	4.61	143	1.8	23.7	ND	117	ND	1.4	17.3	1450	7760	1.9	ND	12540	1820	501	11.3	1100	1710	296	ND	116	20.5	7.4
S-0683	27136-03	mg/Kg	15.3	112	3.9	39.9	ND	528	ND	2.1	26.9	2020	5800	3.7	ND	13430	1110	727	5.8	353	1910	124	ND	287	11.7	6.9
S-0696	27136-06	mg/Kg	7.8	153	3.7	13.9	ND	750	ND	1.6	31.9	3020	8870	1.2	ND	14220	1590	722	9.8	573	2070	ND	ND	288	20.0	7.0
S-0698	27136-01	mg/Kg	4.6	147	1.4	10.2	ND	154	ND	ND	16	1160	8290	ND	ND	11890	1740	472	12	663	1870	ND	ND	119	20.1	6.5
S-0708	27136-07	mg/Kg	10.7	86.8	2.8	12.5	ND	219	ND	1.6	21.5	1950	5340	3.9	ND	12490	1750	284	17.8	504	1600	ND	ND	173	14.3	6.2
S-0709	27136-08	mg/Kg	12.2	256	3.8	11.4	ND	383	ND	2.4	31.6	2440	12390	4.3	ND	16200	1470	918	10.9	712	1950	ND	ND	396	14.3	8.1
S-0728	27136-02	mg/Kg	14.9	146	3.3	24.2	ND	221	ND	ND	18.4	2950	7520	ND	ND	14460	1410	640	9.0	719	2100	ND	ND	316	11.2	6.9
S-0734	27136-05	mg/Kg	15.6	131	3.9	77.7	ND	247	ND	ND	29.6	1720	7750	ND	ND	15970	1300	588	11.1	639	2210	ND	ND	298	13.9	7.6
S-0735	27136-04	mg/Kg	17.4	165	3.5	48.4	ND	455	ND	1.4	35.1	3000	8650	1.8	ND	16610	1570	706	17.7	743	2220	ND	ND	403	13.9	8.0
S-0772	27178-10	mg/Kg	11.4	164	6.6	14.2	ND	546	ND	1.5	23.7	2170	9800	4.7	ND	11700	1730	732	6.9	433	ND	84	ND	431	13.1	4.9
S-0793	27178-11	mg/Kg	8.5	195	3.7	11.0	ND	256	ND	ND	18.9	1720	8930	3.3	ND	10160	1200	507	5.3	652	840	39	ND	199	13.5	3.9
S-0824	27178-12	mg/Kg	28.6	206	10.1	8.6	5.2R	10900	ND	44.6	134	1940	8790	120	ND	23320	1790	1530	7.0	499	1070	39	ND	1290	12.8	5.7
S-0825	27178-13	mg/Kg	12.8	203	6.0	9.0	ND	355	ND	1.6	25.7	2970	15370	4.2	ND	13320	2580	637	6.6	1020	1880	70	ND	326	18.3	5.2
S-0847	27178-14	mg/Kg	11.8	211	4.1	32.1	ND	623	ND	3.3	80.7	6880	12480	7.1	ND	19520	4920	776	13.9	862	2390	75	ND	364	33.9	11.7
S-0894	27178-15	mg/Kg	15.8	212	4.7	9.9	ND	404	ND	2.0	37.1	2120	12940	6.6	ND	14830	1420	934	7.5	414	1350	55	ND	332	14.3	5.8
S-0919	27178-16	mg/Kg	24.5	101	3.3	114	ND	372	ND	1.3	27.3	1130	14750	3.1	ND	13130	1230	448	6.0	322	2210	70	ND	164	21.9	3.7
S-0922	27178-17	mg/Kg	13.4	188	7.4	36.8	ND	408	ND	2.5	38.3	2240	15720	9.1	ND	12880	1220	804	6.6	518	2380	96	ND	322	15.8	5.1
S-0950	27178-18	mg/Kg	12.1	227	3.7	13.3	ND	665	ND	1.5	73.3	3860	14300	5.8	ND	13690	1360	880	7.1	681	2460	102	ND	761	16.1	6.6

J: Sample qualified as an estimate

R: Sample result rejected due to grossly exceeded holding times.

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M E M O R A N D U M

To: Jerry Lee, TerraGraphics, Moscow

From: Shanda LeVan, TerraGraphics, Moscow

Date: June 6, 2000

Subject: QA/QC review for soil, dust, and water samples collected during the Summer and Fall 1999 Basin Risk Assessment sampling events, and analyzed through the Contract Laboratory Program (CLP).

Introduction

The following memorandum summarizes the quality assurance/quality control (QA/QC) review for soil, dust, and water samples collected during the Summer and Fall 1999 Basin Risk Assessment sampling events. These samples were analyzed through the Contract Laboratory Program (CLP) for 23 metals by Chemtech Consulting Group, Englewood, NJ., and by Sentinel, Inc., Huntsville, AL.

General

A QA/QC review was done to evaluate the precision, accuracy, completeness, and representativeness of the data obtained from the field. An initial Quality Assurance review of the laboratory data was conducted through EPA Region 10 and is not included in this memo. EPA's overall assessment of the data indicated that all samples were analyzed in accordance with the Quality Control specifications outlined in the CLP Statement of Work (SOW) for inorganic analysis and the data, as qualified, is acceptable for all purposes. All 23 analytes were 100% complete for all samples except for antimony and mercury. For antimony, 82 of the 1445 samples were rejected based on EPA's review of internal laboratory QA/QC methods. The completeness for Antimony is 94.3%. The holding time for mercury was exceeded for all samples, thus all detected mercury results were qualified as estimates and all undetected mercury results were qualified as rejected and unusable. Mercury was rejected for 672 of the 1445 samples resulting in 53.5% completeness.

The purpose of this memo is to evaluate QA/QC for field sampling and integrate this evaluation with EPA's evaluation of laboratory QA/QC. Procedures for sample labeling, handling, and analysis were as described in the Procedures for the Coeur d'Alene River Basin Risk Assessment Sampling Event (TerraGraphics 1999) and in the Field Sampling Plan and Quality Assurance Project Plan for the Bunker Hill Basin-Wide RI/FS (URS Greiner & CH2M Hill 1998). This data validation review indicated all samples were properly labeled and tracked during the project. In December 2000, 1445 samples (including QA/QC) were shipped and analyzed through the Environmental Protection Agency's (EPA) Contract Laboratory Program (CLP). These 1445 samples were analyzed for 23 metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc).

Field Sampling QA/QC Results

A total of 1445 samples (including QA/QC) were analyzed. A summary of the Fall and Summer 1999 CLP samples, including the QA/QC samples, is presented in Table 1. Of the 1445 samples, 27 rinsate blanks, 431 yard soil, 265 driveway soil, 76 garden soil, 50 play area soil, 260 Right-of-way (ROW) soil, 118 initial drinking water, 120 purged drinking water, and 98 vacuum dust samples were analyzed; and of these, 132 were duplicates and six were splits. The six splits were collected, although the work plan did not call for the collection of splits. All samples were banked and recorded on a master log, and chain of custody forms were completed and checked before samples were shipped to the lab.

Table 1 Summary of 1999 Fall and Summer CLP Samples

Location/Media	Samples	Duplicates	Splits	Total
Rinsate Blanks	27	--	--	27
Yard Soil	401	30	--	431
Driveway Soil	233	32	--	265
Garden Soil	64	12	--	76
Play Area Soil	47	3	--	50
ROW Soil	241	13	6	260
Initial Drinking Water	107	11	--	118
Purged Drinking Water	101	19	--	120
Vacuum Dust	86	12	--	98
Total	1307	132	6	1445

Rinsate Blanks

Rinsate blanks were collected at the end of each sampling day to ensure decontamination procedures were effective, and that cross-contamination was not significant during field sampling. Rinsate blanks consisted of commercially available distilled water poured over a representative batch of decontaminated sampling equipment. Rinsate blanks were collected into 500 ml plastic bottles and preserved with nitric acid. The bottles were supplied by SVL Analytical Laboratories of Smelterville, Idaho.

Twenty seven rinsate blanks were collected during sampling. Rinsate blank results are presented in Table 2. Metal concentrations were below the CRDL in most rinsate samples, and detected concentrations were well below the concentrations found in the field samples. Based on this information, it was determined that decontamination procedures were adequate for the project and no qualifiers were placed on the data.

Field Duplicates

Field duplicates consisted of two samples taken consecutively at each site. Duplicate samples were used to measure the variability of sampling technique and the natural variation in soil, dust, and water samples. It is expected that the variability in soil and dust is greater than the variability from the drinking water samples. A total of 132 duplicate samples were collected in the field and submitted to the laboratory for analysis.

Results for the field duplicate analysis for yard soil, discrete garden, discrete play area, discrete driveway, ROW, vacuum dust, initial drinking water, and purged drinking water are presented in Tables 3a, 3b, 3c, 3d, 3e, 3f, and 3g, respectively. Data quality objectives for the project specified that the duplicates would have relative percent differences (RPDs) within ±35%. RPDs were not calculated for duplicate pairs that were below the contract required detection limit (CRDL).

Soils from yard, discrete garden, and discrete play areas were sampled using a core barrel and slam bar. Forty five soil core duplicates were sampled. Duplicates were collected by splitting the core sample in half lengthwise, thus duplicate results were expected to be fairly precise. However, 11.5% of the soil core duplicate results were outside of the 35 percent precision limit. Soil from driveway and ROW samples were collected from sample pits about one foot wide. The duplicate samples were collected from the same location in the pit as the original. Fifty one soil pit duplicates were collected in the field. Soil pit duplicates results were similar to soil core results with 9.5% of the results being outside the 35 percent precision limit. RPDs outside of the 35 percent limit for soil samples are likely due to low homogeneity in the soil and/or the occurrence of hot spots. No samples were qualified as estimates based on field duplicate results.

There were 12 vacuum dust duplicate samples collected and analyzed. RPDs were within the 35 percent precision limit for all but 11.1% of the vacuum dust duplicate samples. Twenty four drinking water duplicates were sampled and analyzed. It was expected that the drinking water duplicates would have higher precision than the soil and dust samples. Actually, only 78.1% of drinking water duplicates were within the 35 percent precision limit. It must be noted that this only applies to detected concentrations and that 419 of the 552 or 76% of the water duplicate analyses for all metals were below the CRDL. If below detection values were included in the precision calculation, 94.7% of the drinking water duplicates would be within the 35 percent precision limit.

Field Splits

Split samples were composed of one-half of a soil sample that has been homogenized in the field. Split samples are collected to examine variability in laboratory procedures. Six split samples were collected from ROWs. Only five of the six split pairs were analyzed. Results for the field split analyses are presented in Table 4. One split result had RPDs above 35 percent for 15 of the 23 metals analyzed. For the other three splits, RPDs were within the 35 percent precision limit for 86.7% of the split results for all metals. For two of the splits, the original and split sample were

analyzed by two different labs, one of the samples from each pair had insufficient volume to be sampled CLP, and was analyzed by Anatek Labs, Inc. of Moscow, Idaho. Thus, the data must be interpreted carefully, because analysis occurred at two different labs. With this, and the fact that there were only five split pairs analyzed, it is difficult to determine any recommendations for effect of split results on the field data. Thus, no qualifiers were placed on the data based on field split results.

Conclusions

A check of field decontamination procedures was assessed using rinsate blanks. Metal concentrations were below the CRDL in most rinsate samples, and all detected concentrations were well below the concentrations found in the field samples. No qualifiers were placed on the data based on rinsate blank results.

Field duplicates were sampled to measure the variability of sampling technique and the natural variation in soil, dust, and water samples. Core soil and pit soil duplicates were within the 35 percent precision limit for more than 88% of the soil duplicates. These precision results for soil samples is likely due to low homogeneity in the soil and/or the occurrence of hot spots. Vacuum dust sample duplicate results were also within the 35 percent precision limit for more than 88% of the duplicate analyses. Seventy eight percent (78.1%) of the water duplicates were within the precision limit, with 76% of the duplicates being below the CRDL. No qualifiers were placed on the data based on soil, dust, and water duplicate results.

Although the work plan did not call for them, five split samples were analyzed and compared with the originals. The results were inconclusive based on the low number of splits and due to two pairs being analyzed by two different laboratories. No qualifiers were placed on the data based on field splits.

Based on the review of rinsate blanks, field duplicates, and field splits, the final completeness, based on field QA/QC results, for the study was assessed at 100%. In addition, laboratory QA/QC reviews completed by EPA indicated that all samples were analyzed in accordance with the Quality Control specifications outlined in the CLP Statement of Work (SOW) for inorganic analysis and the data, as qualified, is acceptable for all purposes. Based on EPA's laboratory QA/QC review, completeness was assessed at 100% for all metals except for antimony and mercury, which were 94.3% and 53.5% complete, respectively.

Table 2 - 1999 Coeur d' Alene Basin Summer and Fall CLP Rinsate Blanks

EPA Sample Number	Aluminum ug/L	Antimony ug/L	Arsenic ug/L	Barium ug/L	Beryllium ug/L	Cadmium ug/L	Calcium ug/L	Chromium ug/L	Cobalt ug/L	Copper ug/L	Iron ug/L	Lead ug/L
MJCP05	100.0 U	2.1 UJ	2.2 U	0.8 U	0.1 U	0.3 U	2590.0 U	0.3 U	0.6 U	10.3 U	18.6 U	3.1
MJCP18	34.9 U	2.1 UJ	2.2 U	0.8 U	0.1 U	0.3 U	2590.0 U	0.3 U	0.6 U	1.6 J	45.6 U	1.1 U
MJCP20	34.9 U	2.1 UJ	2.2 U	0.8 U	0.1 U	0.4 U	2590.0 U	3.0 U	0.6 U	2.2 UJ	89.4 U	1.1 U
MJCS41	34.9 J	2.1 J	2.2 U	47.8 U	0.1 U	1.6 J	8590.0	0.3 U	0.6 U	48.8	18.6 J	3.5
MJCS49	34.9 J	2.1 J	2.2 U	0.8 U	0.1 U	0.3 J	2590.0 U	0.3 U	0.6 U	3.3 J	67.8 U	2.0 U
MJCS52	34.9 J	4.2 UJ	12.0 U	0.8 U	0.1 U	0.3 J	2590.0 U	0.3 U	0.6 U	6.4 U	92.4 U	3.2
MJCS76	24.6 J	5.0 UJ	6.0 U	1.1 U	1.4 U	1.0 U	111.0 U	1.0 U	1.0 U	24.0 U	92.1 U	8.1
MJCS98	28.3 U	5.0 UJ	6.0 U	1.1 U	1.0 U	1.0 U	334.0 U	1.0 U	1.0 U	28.1	46.0 U	2.0 U
MJCZ07	34.9 J	2.1 J	2.2 U	0.8 U	0.1 U	0.3 J	2590.0 U	0.4 J	0.6 U	1.8 J	18.6 U	1.7 U
MJCZ11	34.9 J	2.1 J	2.2 U	0.8 U	0.1 U	0.3 J	2590.0 U	0.3 J	0.6 U	1.2 J	18.6 U	1.1 U
MJCZ33	49.2 U	2.1 J	2.2 J	1.0 U	0.1 U	0.3 U	2590.0 U	0.3 J	0.6 U	1.8 U	44.2 U	1.1 U
MJCZ36	34.9 U	2.1 J	2.2 J	0.8 U	0.1 U	0.3 U	2590.0 U	0.3 J	0.6 U	1.3 U	18.6 U	1.1 U
MJCZ38	34.9 U	2.1 J	2.2 J	0.8 U	0.1 U	0.3 U	2590.0 U	0.3 J	0.6 U	0.6 U	18.6 U	1.1 U
MJCZ56	34.9 U	2.1 J	2.2 U	0.8 U	0.1 U	0.3 U	2590.0 U	0.3 J	0.6 U	3.0 UJ	18.6 U	1.1 U
MJCZ60	34.9 U	2.1 J	2.2 U	0.8 U	0.1 U	0.3 U	2590.0 U	0.3 J	0.6 U	1.4 UJ	24.3 U	1.1 U
MJCZ67	30.3 U	5.0 U	6.0 U	1.0 U	1.0 U	1.0 U	16.0 U	1.0 U	1.0 U	1.0 U	16.0 U	2.0 UJ
MJCZ70	51.0 U	5.0 U	6.0 U	1.0 U	1.0 U	1.0 U	68.1 U	1.0 U	1.0 U	9.7 U	19.5 U	2.0 UJ
MJCZ95	14.3 U	5.0 U	6.0 U	1.0 U	1.0 U	1.0 U	61.7 U	1.0 U	1.0 U	5.6 U	55.8 U	2.0 U
MJCZ96	14.0 U	5.0 U	6.0 U	1.0 U	1.0 U	1.0 U	16.0 U	1.0 U	1.0 U	1.0 U	16.0 U	2.0 U
MJDC04	34.9 J	2.1 J	2.2 U	0.8 U	0.1 U	0.3 J	2590.0 U	0.3 U	0.6 U	7.9 U	36.8 U	1.2 U
MJDC15	34.9 J	2.1 J	2.2 U	0.8 U	0.1 J	1.0 UJ	2590.0 U	0.3 J	0.6 J	1.8 U	18.6 U	1.1 U
MJCN95	119.0 U	2.1 UJ	2.2 U	1.0 U	0.1 U	0.3 U	2590.0 U	0.3 U	0.6 U	5.0 U	18.6 U	2.9 U
MJCP12	34.9 U	2.1 UJ	2.2 U	0.8 U	0.1 U	0.3 U	2590.0 U	0.4 U	0.6 U	0.5 UJ	275.0	1.1 U
MJCP24	34.9 U	2.1 UJ	2.2 U	0.8 U	0.1 U	0.8 U	2590.0 U	0.8 U	0.6 U	11.4 J	53.6 U	1.1 U
MJCP32	34.9 U	2.1 UJ	2.2 U	0.8 U	0.1 U	0.3 U	2590.0 U	0.6 J	0.6 U	9.2 U	21.0 U	1.1 U
MJCP44	34.9 U	2.1 UJ	2.2 U	0.8 U	0.1 U	0.3 U	2590.0 U	0.3 UJ	0.6 U	6.2 U	18.6 U	1.1 U
MJCP46	34.9 U	2.1 UJ	2.2 U	0.8 U	0.1 U	0.3 U	2590.0 U	0.3 UJ	0.6 U	18.1 U	18.6 U	1.4 U

R: Result rejected based on the data validation process.
J: The associated value is an estimate.
U: The analyte was not detected at or above the reported result.
UJ: The analyte was not detected at or above the reported result and the value is an estimate.

Table 2 (Cont'd) - 1999 Coeur d' Alene Basin Summer and Fall CLP Rinsate Blanks

EPA Sample Number	Magnesium ug/L	Manganese ug/L	Mercury ug/L	Nickel ug/L	Potassium ug/L	Selenium ug/L	Silver ug/L	Sodium ug/L	Thallium ug/L	Vanadium ug/L	Zinc ug/L
MJCP05	38.8 U	2.4 U	R	1.3 U	60.0 U	1.8 U	0.4 U	173.0 UJ	2.1 U	0.5 U	46
MJCP18	38.8 U	2.4 U	R	1.3 U	38.0 U	1.8 U	0.4 U	155.0 UJ	2.1 UJ	0.5 U	320
MJCP20	38.8 U	2.4 U	R	3.1 U	68.9 U	1.8 U	0.4 U	535.0 UJ	2.1 UJ	0.5 U	327
MJCS41	3400.0 U	2.4 U	R	1.6 U	934.0 J	1.8 U	0.4 U	323.0 U	2.1 U	0.5 U	848.0
MJCS49	38.8 U	2.4 U	R	1.3 U	52.7 J	1.8 U	0.4 U	189.0 UJ	2.1 U	0.5 U	14.2 U
MJCS52	38.8 U	2.4 U	R	1.3 U	47.6 J	1.8 U	0.4 U	155.0 J	2.1 U	0.5 U	54.8
MJCS76	26.1 U	6.5 U	R	2.0 U	39.0 U	5.0 U	1.0 U	175.0 U	7.0 U	2.0 U	75.0
MJCS98	37.0 U	1.0 U	R	2.0 U	39.0 U	5.0 U	1.0 U	251.0 U	7.0 U	2.0 U	159.0
MJCZ07	38.8 U	2.4 U	R	1.7 U	8.3 J	1.8 U	0.4 J	210.0 U	2.1 U	0.5 J	18.4 U
MJCZ11	38.8 U	2.4 U	R	1.3 U	3.2 J	1.8 U	0.4 J	155.0 U	2.1 U	0.5 J	12.9 U
MJCZ33	38.8 U	2.4 U	R	1.3 U	30.6 UJ	1.8 U	0.4 U	155.0 U	2.1 U	0.5 U	12.9 U
MJCZ36	38.8 U	2.4 U	R	1.3 U	35.8 UJ	1.8 U	0.4 U	155.0 U	2.1 U	0.5 U	17.0 U
MJCZ38	38.8 U	2.4 U	R	1.3 U	30.0 UJ	1.8 U	0.4 U	155.0 U	2.1 U	0.5 U	12.9 U
MJCZ56	38.8 U	2.4 U	R	1.3 U	70.4 J	1.8 U	0.4 U	173.0 U	2.4 U	0.5 U	12.9 U
MJCZ60	38.8 U	2.4 U	0.1 J	1.3 U	54.5 J	1.8 U	0.4 U	174.0 U	2.4 U	0.5 U	15.4 U
MJCZ67	23.0 U	1.0 U	R	2.0 U	39.0 U	5.0 U	1.0 U	23.0 U	7.0 U	2.0 U	2.0 U
MJCZ70	23.0 U	1.0 U	R	2.0 U	39.0 U	5.0 U	1.0 U	133.0 U	7.0 U	2.0 U	34.3
MJCZ95	25.8 U	1.0 U	R	2.0 U	39.0 U	5.0 U	1.0 U	129.0 U	7.0 U	2.0 U	13.8 U
MJCZ96	23.0 U	1.0 U	R	2.0 U	39.0 U	5.0 U	1.0 U	23.0 U	7.0 U	2.0 U	2.0 U
MJDC04	38.8 J	2.4 U	R	1.3 U	62.2 U	1.8 U	0.7 U	299.0 UJ	4.1 U	0.5 U	22.4
MJDC15	38.8 U	2.4 U	R	1.3 U	38.7 U	1.8 U	0.4 U	1340.0 UJ	2.4 U	0.5 U	12.9 U
MJCN95	39.0 U	2.4 U	R	1.3 U	68.6 U	1.8 U	0.4 U	155.0 UJ	2.1 U	0.5 U	179
MJCP12	38.8 U	2.4 U	R	1.3 U	54.4 U	1.8 U	0.4 U	325.0 UJ	2.1 UJ	0.5 U	262
MJCP24	38.8 U	2.4 U	R	1.3 U	67.4 U	1.8 U	0.6 U	961.0 UJ	2.1 UJ	0.5 U	320
MJCP32	38.8 U	2.4 U	R	2.4 U	25.9 U	1.8 U	0.4 UJ	199.0 U	2.1 U	0.5 UJ	140
MJCP44	38.8 U	2.4 U	R	1.3 U	32.5 U	1.8 U	0.4 UJ	296.0 U	2.1 U	0.5 UJ	73.2
MJCP46	38.8 U	2.4 U	R	1.3 U	28.3 U	1.8 U	0.4 UJ	155.0 U	2.1 U	0.5 UJ	307

R: Result rejected based on the data validation process.
J: The associated value is an estimate.
U: The analyte was not detected at or above the reported result.
UJ: The analyte was not detected at or above the reported result and the value is an estimate.

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M E M O R A N D U M

To: Jerry Lee, TerraGraphics, Moscow

From: Shanda LeVan, TerraGraphics, Moscow

Date: April 5, 2000

Subject: QA/QC Review for the low weight soil, vacuum dust, and dust mat samples collected during the Summer and Fall 1999 Basin Risk Assessment sampling events.

Introduction

The following memorandum summarizes the quality assurance/quality control (QA/QC) review for the low weight soil, vacuum dust, and dust mat samples collected during the Summer and Fall 1999 Basin Risk Assessment sampling events. These samples were analyzed for 7 metals by Anatek Labs, Inc. of Moscow.

General

A QA/QC review was done to evaluate the precision, accuracy, completeness, and representativeness of the data obtained from both the field and the laboratory. Procedures for sample labeling, handling, and analysis were as described in the Procedures for the Coeur d' Alene River Basin Risk Assessment Sampling Event (TerraGraphics 1999) and in the Field Sampling Plan and Quality Assurance Project Plan for the Bunker Hill Basin-Wide RI/FS (URS Greiner & CH2M Hill 1998). This data validation review indicated all samples were properly labeled and tracked during the project. In February 2000, 67 prioritized soil, vacuum, and mat dust samples were selected from the low weight samples that did not get analyzed through the Environmental Protection Agency's (EPA) Contract Laboratory Program (CLP). These 67 samples were sent to Anatek Labs, Inc. in Moscow, Idaho for analysis of seven metals (antimony, arsenic, cadmium, iron, lead, manganese, and zinc). All data appear in Table 1.

The residential yard soil field duplicate and corresponding original sample (ALI007; ALI006) had a Relative Percent Difference (RPD) of 29.6 for lead. This RPD is above the accepted range, therefore all residential yard soil samples analyzed by Anatek in this batch were qualified as estimates for lead.

The lead concentration percent recovery was 119% for dust mat standard 99M10566. The average percent recovery for lead concentration was 65% for the 1999 Interior House Dust sampling event within the Bunker Hill Superfund Site. Sample 99M10565 had a lead concentration percent recovery close to this (69%), but sample 99M10566 was an anomoly, especially when compared with past studies. All dust mat samples batched with sample 99M10566 have been qualified as estimates for all metals except iron based on percent recovery of 99M10566.

Two dust mat samples were qualified as estimates for the loading portion of the study based on answers to the questionnaire given upon retrieval of the dust mats. The loading was estimated for sample 99M10544 because it had been shaken once. The loading for sample 99M10551 was determined to be an estimate because the resident indicated that they were gone from the home 10 or more days during the study.

In reviewing the internal QA/QC, one method blank was found to contain a zinc concentration of 3.76 mg/kg. This concentration was significantly lower than zinc concentrations found in the 67 samples, thus no samples were qualified based on the method blank results. Laboratory precision was also assessed using duplicate analyses. One duplicate for arsenic displayed a 27.1 RPD value, which is above the accepted range, and all samples batched with this duplicate were qualified as estimates. No other qualifiers were placed on the data based on internal laboratory QA/QC samples.

Field Sampling QA/QC Results

A total of 67 samples (including QA/QC) were analyzed. Of the 67 samples, 11 vacuum dust samples were analyzed, 28 mat dust samples were analyzed; and of these, two were mat duplicates and two were mat standards. The rest were soil samples with 10 collected from residential yards and 18 from right-of-ways (ROWs). Of the 10 residential yard soil samples, one was a duplicate. Of the 18 ROW samples, one was a split, and one a duplicate; however the original samples were not analyzed by Anatek, they were analyzed through EPAs Contract Laboratory Program (CLP). These two ROW field QC samples will be compared to the results from the original CLP samples and discussed in the 1999 Basin CLP QA/QC Memo.

Duplicates

For dust mats, a field duplicate consisted of a second dust mat being placed directly next to the original. Duplicate dust mat samples were used to examine variability in the field procedures. Two duplicates were collected in the field and submitted to Anatek for analysis. The RPDs were calculated for all 7 metals for samples 99M10552 and 99M10560. These RPDs are displayed in Table 2. RPDs for sample 99M10552 were low for all 7 metals; the RPDs for sample 99M10560 were all significantly higher for the 7 metals. However, the degree of variability is consistent with earlier dust mat sampling programs. Because it was necessary to place the duplicate mats behind the original mats at most homes, many times the duplicates receive considerably less soil than the original mats. No samples were qualified as estimates based on the duplicate dust mat results.

One residential yard soil duplicate was collected in the field. The residential yard soil duplicate was obtained by splitting the soil core sample in half lengthwise and placing half in the original sample bag and the other half in the duplicate sample bag. The residential soil duplicate and the

original sample were both analyzed by Anetek and all RPDs were within the accepted range for all metals except for lead which had an RPD of 29.6. Based on the high RPD for lead in the residential yard soil duplicate, all residential yard soil samples analyzed by Anatek in this batch were qualified as estimates for lead.

The ROW duplicate and split samples will be matched with the original samples (analyzed through CLP). The data will be interpreted carefully, because analysis occurred at two different labs. The review of these two QC samples and their originals will be discussed in the 1999 Basin CLP QA/QC Memo. The residential soil duplicate, the duplicate dust mat results, and the results for the two ROW QC samples are presented in Table 2.

Laboratory Analysis

A total of 60 samples (excluding field QA/QC samples) were submitted to Anatek and analyzed for 7 metals. Laboratory QA/QC was checked externally by duplicate samples collected in the field and by including two dust mat standards submitted blind to the laboratory for analysis of 7 metals. Anatek provided a copy of their internal QA/QC results for method blanks, laboratory control samples (LCS), duplicate analysis, and matrix spike/matrix spike duplicate (MS/MSD) analysis.

External QA/QC

A pre-loaded mat standard is inserted at the University of Idaho vacuum lab for every 20^{th} dust mat sample collected. There were 26 dust mats collected during the summer 1999 Basin Risk Assessment, thus two pre-loaded mat standards were included for vacuuming and the recovered samples were submitted blind to Anatek. Pre-loaded mats contained 10 grams of NIST standard 2711 Montana Soil containing 1162 mg/kg lead, 19.4 mg/kg antimony, 105 mg/kg arsenic, 41.7 mg/kg cadmium, 638 mg/kg Manganese, and 350.4 mg/kg zinc. The iron concentration in the standard was undetermined.

The standards were used to evaluate both the dust recovery of the vacuum method, as well as accuracy of the lab analysis. The percent recoveries on dust mass for the standards were 88% and 82% for 99M10565 and 99M10566, respectively. The percent recoveries for lead concentration were 69% (99M10565) and 119% (99M10566). The average percent recovery for lead concentration was 65% for the 1999 Interior House Dust sampling event within the Bunker Hill Superfund Site. Sample 99M10565 had a lead concentration percent recovery close to this, but sample 99M10566 appeared to be an anomaly when compared with past studies. Therefore, mats batched with 99M10566 during analysis by Anatek will be qualified as estimates. The percent recoveries for lead mass were 61% (99M10565) and 98% (99M10566). Again sample 99M10565 is more in line with average percent recoveries for lead mass in past studies. Percent recovery results are presented in Tables 3a, 3b, and 3c.

In 1997, 1998, and 1999 house dust studies within the Bunker Hill Superfund Site showed standard percent recoveries for lead concentration from mats to be low (around 65%-80%). It was determined from mass balance calculations on the mats using NIST standard soils that fiber dilution of vacuum samples is a possible cause of reduced percent recovery on concentration for low mass recovery samples. Another possible explanation for the decreased percent recovery on concentration is preferential retention of the clays (which are predominately lead bearing) on the

somewhat sticky vinyl surface, thereby reducing the total amount of lead available for vacuum removal. Additionally, the sieved portion of many dust mat samples in past projects have contained significant amounts of fibers. Numerous mat fibers were clearly visible in 1997 and 1998 laboratory photographs of the sieved portion of the samples. For these reasons, no qualifiers were placed on the data based on the standard results.

Internal QA/QC

Internal checks of Anatek's accuracy were assessed by analyzing five soil laboratory control samples (LCS). All LCS displayed acceptable percent recoveries and/or were within the acceptable range specified by Anatek. LCS results are presented in Table 4.

Anatek analyzed a total of five method blanks to ensure no bias was introduced during sample preparation. All method blanks were below the instrument detection limits for all metals analyzed except zinc, which was detected at 3.76 mg/kg in one of the five method blanks. All samples analyzed for zinc contained values significantly higher than that detected in the blank, with the lowest zinc concentration being 51.4 mg/kg, thus no qualifiers were placed on the data based on Anatek's method blank results. Table 5 displays the method blank results.

Internal checks of laboratory precision at Anatek were assessed using matrix spike/matrix spike duplicates (MS/MSD). MS/MSD were analyzed on five of the 67 samples (approximately 1 in 13.4). Calculated RPD values for the MS/MSD samples were within acceptable limits and ranged from 0.0% to 3.9%, with an average of 1.8% for all 7 metals. Spike percent recoveries were within acceptable limits and no qualifiers were placed on the data based on MS/MSD analysis. MS/MSD results are found in Table 6.

Four laboratory duplicates were analyzed by Anatek to further evaluate internal laboratory precision. One duplicate for arsenic displayed a 27.1 RPD value which is above the accepted range and all samples batched with this duplicate were qualified as estimates. No other qualifiers were placed on the data based on laboratory duplicate analysis. Laboratory duplicate results are presented in Table 7.

Conclusions

Field and lab variability were assessed using field duplicates. Analysis of two dust mat duplicates indicated relatively high variability which is attributable to the procedure. The residential yard soil field duplicate and corresponding original sample (ALI007; ALI006) had a Relative Percent Difference (RPD) of 29.6 for lead. This RPD is above the accepted range, therefore all residential yard soil samples analyzed by Anatek in this batch were qualified as estimates for lead.

An external check of Anatek lab accuracy was assessed using soil standards of known concentrations inserted blind with the dust mat field samples. Percent recoveries were low for one mat standard and was likely a result of the sample procedures. No qualifiers were placed on the data based on the standards.

An internal check of Anatek's laboratory accuracy was assessed using soil LCS. All LCS percent recovery results were within acceptable limits. One method blank contained a zinc concentration of 3.76 mg/kg, but was significantly lower than the zinc concentrations found in the 67 samples.

Laboratory precision was also assessed using duplicate analyses. One duplicate (99M10052) for arsenic displayed a 27.1 RPD value which is above the accepted range and all samples batched with this duplicate were qualified as estimates. No other qualifiers were placed on the data based on internal laboratory QA/QC samples. A summary of the sample results with qualifiers is presented in Table 1.

Based on a complete review of the field duplicates and standards, method blanks, LCS, duplicate analyses, and MS/MSD analysis, the final completeness for the study was assessed at 100%.

Table 1 - Coeur d' Alene Basin 1999 Low Weight Sample Results

Sample #	Lab #	Matrix	Units	Antimony	Arsenic	Cadmium	Lead	Iron	Manganese	Zinc
99M10538	27635-01	Mat Dust	mg/Kg	ND	4.05	ND	53.4	14850	402	235
99M10539	27635-02	Mat Dust	mg/Kg	5.75	3.28	ND	111	16390	339	335
99M10540	27635-03	Mat Dust	mg/Kg	2.63	8.66	ND	121	13480	329	339
99M10541	27635-04	Mat Dust	mg/Kg	103	ND	ND	68.7	16630	324	211
99M10542	27635-05	Mat Dust	mg/Kg	4.61	ND	ND	41.3	8050	174	303
99M10543	27635-06	Mat Dust	mg/Kg	3.18	4.49	ND	105	27530	502	200
99M10544	27635-07	Mat Dust	mg/Kg	2.49	4.66	3.11	469	11590	310	603
99M10545	27635-08	Mat Dust	mg/Kg	ND	2.99	ND	93.6	11650	353	946
99M10546	27635-09	Mat Dust	mg/Kg	ND	4.48	5.63	95.4	14840	260	301
99M10547	27635-10	Mat Dust	mg/Kg	ND	5.05	3.84	118	18430	354	170
99M10548	27635-12	Mat Dust	mg/Kg	ND	ND	3.15	289	16240	292	446.00
99M10549	27635-13	Mat Dust	mg/Kg	8.08	ND	ND	57.7	24800	404	170.00
99M10550	27635-14	Mat Dust	mg/Kg	64.1	4.6J	2.03	111	15240	388	370.00
99M10551	27635-15	Mat Dust	mg/Kg	6.85	8.5J	18.6	2390	11440	348	6070.00
99M10552	27635-16	Mat Dust	mg/Kg	ND	3.1J	ND	117	11900	299	274.00
99M10553	27635-17	Mat Dust	mg/Kg	ND	3.5J	ND	132	12090	294	304.00
99M10554	27635-18	Mat Dust	mg/Kg	ND	15.7J	3.21	318	17350	582	878.00
99M10555	27635-19	Mat Dust	mg/Kg	ND	4.2	ND	82.8	15640	352	175.00
99M10556	27635-20	Mat Dust	mg/Kg	ND	3.7J	ND	105	22160	428	356.00
99M10557	27635-21	Mat Dust	mg/Kg	ND	24.6J	ND	33.9	10420	321	1520.00
99M10558	27635-22	Mat Dust	mg/Kg	ND	11.2J	ND	94.3	17040	424	237.00
99M10559	27635-23	Mat Dust	mg/Kg	ND	8.5J	ND	53.6	12760	279	654.00
99M10560	27635-24	Mat Dust	mg/Kg	4.04	86.2J	ND	35.7	9800	263	307.00
99M10562	27635-26	Mat Dust	mg/Kg	ND	209J	ND	77.7	22510	624	542.00
99M10563	27635-27	Mat Dust	mg/Kg	ND	185J	5.77	105	41570	965	334.00
99M10564	27635-28	Mat Dust	mg/Kg	1.44	7.4J	2.21	123	12090	348	348.00
99M10565	27635-11	Mat Dust	mg/Kg	ND	60.7J	25.8	798	11840	321	216.00
99M10566	27635-25	Mat Dust	mg/Kg	5.31	117J	46.4	1380	21190	616	387.00
99M10030	27635-29	ROW Soil	mg/Kg	8.99	16.2J	4.15	1340	32150	1900	2940
99M10040	27635-30	ROW Soil	mg/Kg	22.5	33.2J	29.1	8110	47300	4890	6730
99M10043	27635-31	ROW Soil	mg/Kg	2.85	13.9J	1.94	683	19570	806	923
99M10052	27635-32	ROW Soil	mg/Kg	10.5	33.9J	4.14	972	28540	1540	2020
99M10066	27635-33	ROW Soil	mg/Kg	18.8	25.7J	18.9	2450	60980	4330	7720
99M10069	27635-34	ROW Soil	mg/Kg	42.9	20.6J	15.5	4750	36800	1690	3910

Table 1 (Cont'd) - Coeur d' Alene Basin 1999 Low Weight Sample Results

Sample #	Lab #	Matrix	Units	Antimony	Arsenic	Cadmium	Lead	Iron	Manganese	Zinc
99M10076	27635-35	ROW Soil	mg/Kg	13.1	19.2J	4.44	1150	36110	2250	3020
99M10080	27635-36	ROW Soil	mg/Kg	14.4	23.6J	10.1	1650	35390	1820	3430
99M10084	27635-37	ROW Soil	mg/Kg	7.45	21.3J	2.62	809	17010	886	553
99M10090	27635-38	ROW Soil	mg/Kg	7.88	25.2J	ND	427	27070	617	511
99M10100	27635-39	ROW Soil	mg/Kg	46.4	48.6J	9.17	7350	28000	1690	1310
99M10132	27635-40	ROW Soil	mg/Kg	38	84.6	14	2650	24880	1310	2140
99M10138	27635-41	ROW Soil	mg/Kg	19.4	65	12.5	1890	32440	1460	2290
99M10149	27635-42	ROW Soil	mg/Kg	8.69	22.5	ND	295	15320	750	243
99M10153	27635-43	ROW Soil	mg/Kg	17	41	4.1	1540	18410	1080	896
99M10177	27635-44	ROW Soil	mg/Kg	21.9	34	10.6	4110	39540	2490	3280
99M10424	27635-49	ROW Soil	mg/Kg	ND	5.38	ND	689	20140	736	350
99M10454	27635-50	ROW Soil	mg/Kg	ND	4.5	ND	21.5	16720	753	95.1
99M10286	27635-47	Residential Soil	mg/Kg	ND	3.43	ND	97.9J	14170	516	133
99M10416	27635-48	Residential Soil	mg/Kg	ND	6.73	ND	59.1J	14570	377	90.8
ALI003	27635-55	Residential Soil	mg/Kg	ND	46.2	ND	84.4J	18610	685	98.2
ALI005	27635-57	Residential Soil	mg/Kg	3.07	11.3	2.85	908J	13120	865	490
ALI006	27635-58	Residential Soil	mg/Kg	ND	47.2	ND	77J	19100	526	90.6
ALI007	27635-59	Residential Soil	mg/Kg	ND	45.4	ND	57.1J	19430	524	78
ALI008	27635-60	Residential Soil	mg/Kg	ND	12.7	ND	25.6J	11610	270	51.4
ALI009	27635-61	Residential Soil	mg/Kg	ND	38	ND	80.5J	18190	551	121
ALI010	27635-62	Residential Soil	mg/Kg	ND	15.9	3.6	124J	16430	553	257
ALI012	27635-64	Residential Soil	mg/Kg	31	47.8	16.2	6260J	27340	2350	1870
99M10270	27635-45	Vacuum Dust	mg/Kg	ND	3.47	6.33	896	6060	151	1270
99M10277	27635-46	Vacuum Dust	mg/Kg	3.22	7.66	5.24	893	28800	386	762
99M10493	27635-51	Vacuum Dust	mg/Kg	ND	115	6.19	59.8	11760	315	334
99M10515	27635-52	Vacuum Dust	mg/Kg	ND	8.75	4.46	106	10780	304	723
ALI001	27635-53	Vacuum Dust	mg/Kg	ND	13.6	ND	81.6	15290	710	114
ALI002	27635-54	Vacuum Dust	mg/Kg	ND	5.27	ND	85.8	8610	349	616
ALI004	27635-56	Vacuum Dust	mg/Kg	69.8	44.8	7.24	862	11740	522	1070
ALI011	27635-63	Vacuum Dust	mg/Kg	12.2	21.7	6.52	686	11000	469	916
ALI013	27635-65	Vacuum Dust	mg/Kg	9.8	17.3	7.8	302	10010	289	852
ALI014	27635-66	Vacuum Dust	mg/Kg	18.8	3.24	ND	75.3	2660	133	190
ALI015	27635-67	Vacuum Dust	mg/Kg	53.2	15.6	2.43	507	11200	347	413

ND: Concentration below instrument detection limit

J: Concentration qualified as an estimate.